KBSI

Toolkit for INtelligent COmbat Planning and Simulation (TINCOPS)

Technology Overview

Knowledge Based Systems, Inc.

Background

- Army Phase I Small Business Innovation Research (SBIR) Projects
- Sponsoring Agency: Army
  - Topographic Engineering Center

The Technology

- TINCOPS
  - Captures and encodes geographic knowledge for usage as military offensive and defensive weapons of warfare
  - Integrates knowledge with GIS
  - Delivers Combat Planning capability based upon knowledge-enhanced GIS

The Opportunity

"Long experience indicates that, all else being equal, military practitioners and their civilian supervisors who purposely make geography work for them are winners more often than not, whereas those who lack sound appreciation for the significance of geography succeed only by accident."

- John Collins, Military Geography

Knowledge Management

- Data: unprocessed symbols
- Information: processed data useful for decision making
- Knowledge: an integrated mixture of information, experience, insight, and know-how in a context useful for problem solving and learning of new knowledge

- Types of Knowledge
  - Ontologies:
    - Geography, Military Planning
  - Declarative, Procedural, Episodic, Configurational
  - Shape / Spatial

- The Knowledge Management Procedure
  - Knowledge Capture (Acquisition)
  - Knowledge Representation, Organization, and Encoding
  - Knowledge Application
  - Long-Term Knowledge Learning
  - Knowledge Effectiveness Measurement

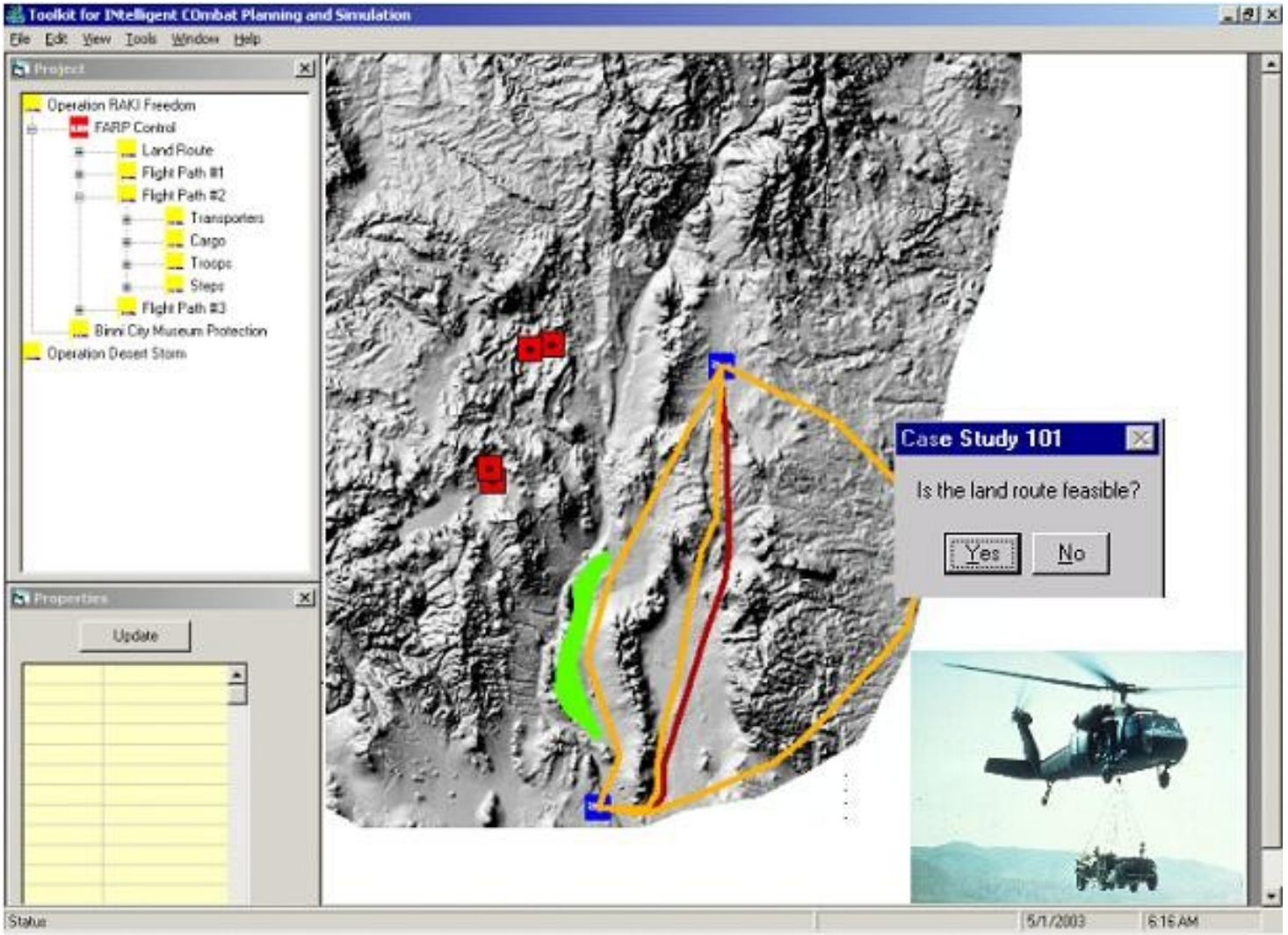
- Methods Used
  - IDEF3 (Process), IDEF5 (Ontology), using rules for encoding expert procedural knowledge
- Knowledge Sources
  - Documents, Published Papers, Books
  - Geospatial Experts
  - Military Planning Experts

Knowledge Application

Military Mission Planning and Decision Support

- Rapid development of alternative courses of action (COA)
- Feasibility and performance analysis of various COA
- Rapid updating of actual geospatial information

Interactive Query Example



Research Significance and Benefits

- Novel Knowledge Management Approach
  - Knowledge Elicitation and Encoding
    - Multi-Source, Multi-Discipline Knowledge
      - Geospatial Knowledge and Military Mission Planning Knowledge
  - Knowledge Application for Mission Plan Analysis
- Scalable, Open-Architecture Solution for Mission Planning Decision Support
  - Rapidly Deployable Plan Analysis Component “Plug Ins”
- Dynamic and Scalable Knowledge Base
  - Scientific and Standard Representation Languages
  - Maintainable Knowledge Base
    - Rule Capture, Ontology Knowledge Capture
    - Scalable Plan Template Library
- Rapid Army Transition and Commercialization Path
  - Aggressive, User-Centered, Spiral Development Approach
  - Insertion Paths
    - Army & Joint Operations Planning
    - Homeland Security – Emergency Response Planning

Other Applications

1. Decision Support

Emergency Rescue Planning

In unusual circumstances have occurred destroying bridges, and highways

Design and Planning Applications in the Hospitality Industry

Planning new tours or exploring different possibilities in a chosen area: expeditions and safaris are such examples.

2. Training

Personnel new to a job that requires spatial knowledge or inference on a particular area will find this type of systems useful.

With the domain-specific knowledge captured and used, such

Conclusions

- TINCOPS project has shown proof-of-concept of effective knowledge management (including application) for mission planning.
- TINCOPS application heavily relies on LOS analysis.
- KBSI’s continued effort on LOS including future research on hardening and expanding TINCOPS technology with the “plugging-in” of different LOS techniques as appropriate.